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A Rapid Evidence Assessment on the effectiveness of remote supervision and new technologies in managing probation service users

HM Inspectorate of Probation

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This bulletin was prepared for HMI Probation by Professor Chris Fox, Jordan Harrison and Andrew Smith from the Policy Evaluation and Research Unit at Manchester Metropolitan University (www.mmuperu.co.uk).

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Executive summary

Context

This bulletin is based on an evaluation of existing empirical evidence, examining the effectiveness of remote supervision approaches and emerging new technologies to manage probation service users and assist with their desistance from further offending. The focus is upon the use of technologies in the context of a supervisory relationship and the delivery of its fundamental characteristics, e.g. developing trust, challenging behaviours etc. Other more specific uses of technology, such as those restricted to surveillance or the delivery of a specific intervention, were out of scope.

Remote supervision typically features a device which allows service users and staff to access information, receive updates and maintain communication. Examples of remote supervision include a wide range of technologies, such as the use of telephones to facilitate supervision meetings, and kiosks at which service users can 'check in' with their officer.



Approach

The bulletin presents the findings from a Rapid Evidence Assessment (REA) undertaken between April 2018 and October 2018. The REA sought to identify and synthesise trustworthy evidence, as the basis for making causal inferences about the effect of remote supervision and technologies on reoffending and other intermediate probationer outcomes. In line with accepted practice, the REA sought to provide an analysis grounded in the current empirical data, and did not focus on providing a more speculative commentary on the topic beyond the data.

An additional thematic review of remotely delivered health interventions was undertaken in October 2018. Healthcare was chosen for review due to some commonalities with probation and a strong tradition of rigorous evaluations. The thematic review of healthcare, included at Annex B, was based upon a search of The Cochrane Database of Systematic Reviews.

Key findings and implications

- Over 22,000 articles published since 2007 were initially identified and reviewed for the REA, but none clearly met the defined criteria for inclusion and further synthesis. Articles were frequently excluded from further analysis as they did not explicitly

satisfy the use of technology within the context of a supervisory relationship as defined in this bulletin (including examples of electronic monitoring with the sole purpose of monitoring service users). Articles were also frequently excluded due to their research design and population of interest.

- In the case of three articles, it was not possible to make a clear judgement about inclusion based on the information available. These studies all used trustworthy research designs, and provide some evidence that the use of technology in supervision may be effective in terms of intermediate outcomes for probationers.
- One RCT study investigated the cost-effectiveness of a specific use of technology. While the technology was found to be potentially cost-saving, there was less certainty whether the findings could be replicated in a real-world context. The study highlighted the need to always consider both initial start-up costs and maintenance costs.
- Given the dearth of robust evidence about the effectiveness of remote supervision and new technologies in managing probation service users, there is a need for new impact evaluations to be conducted. These would ideally be preceded by feasibility studies to assess the viability of undertaking a more resource-intensive impact evaluation, and the potential of such an evaluation to provide valid inferences about cause and effect. The views of both practitioners and service users should also be sought.
- The thematic review of remotely delivered health interventions identified four systematic reviews where a technological solution either completely or partially replaced standard person-to-person treatment. The studies did not find that replacing human face-to-face interventions with technology in this context produced better outcomes, and there was insufficient evidence to judge whether *enhancing* human involvement was more or less effective at delivering outcomes than *replacing* human involvement.
- None of the healthcare studies contained an economic analysis, but it is possible that technology can deliver cost savings without delivering worse outcomes for some users, particularly those in more rural/remote locations. However, the applicability of the healthcare findings to the criminal justice arena should be treated with caution, not least because probation users are mandated to engage, with the potential for sanctions, whereas healthcare clients engage voluntarily based on an assessment of the possible personal benefits.

The REA's lack of findings regarding the effectiveness of remote supervision does not preclude service providers from intelligently using technologies to facilitate or enhance supervision. Any deployment of technology should be based on a clear rationale as to its likely effectiveness (in what context, and for whom), and should include a sufficiently robust form of evaluation. Technological developments can be fast-moving and the review process set out in this study provides a solid basis for further reviews as more evidence becomes available.

1. Introduction

The aim of the REA was to assess the effectiveness of remote supervision and/or new technologies in managing probation service users. REAs are a form of systematic review, but are undertaken over a shorter period than a full review – approximately 3 months, rather than 12 months. REAs and systematic reviews systematically search for, evaluate and synthesise evidence about a specific intervention. Where possible, they include a statistical meta-analysis of individual studies, in order to provide a clear indication of the likely impact (effect size) of the intervention. The evidence which is eligible for synthesis in an REA is that which is *trustworthy*, its design being capable of supporting logical and statistical inference about the causes of observed effects.

Further details about the approach adopted in this REA, which was based on the methodology developed by the Policy Evaluation and Research Unit (PERU) at Manchester Metropolitan University, is provided in Annex A. In this introduction we summarise literature which defines and describes probation supervision and the use of technology in supervision.

1.1. Supervision

Supervision in probation has often been understood in terms of its commonality with supervision and professional helping relationships in other sectors. Consequently, it has not always been understood only in relation to working with involuntary clients (Gursansky, Harvey and Kennedy, 2003). Definitions of supervision vary according to jurisdiction as well as government policy and wider societal factors (Bottoms, Gelsthorpe and Rex, 2001). The Council of Europe (2017) makes clear that ‘supervision’ is integral to community sanctions and measures – these sanctions and measures should be meaningful to offenders and seek to contribute to their personal and social development. Supervision should serve these aims (ibid.).

Despite variations across jurisdictions, supervision typically incorporates the oversight and monitoring of an individual’s activities in the community (Robinson, McNeil and Maruna, 2013). It can include a broad range of functions including monitoring offenders, enforcing court sentencing, ensuring public protection and reducing reoffending. It is also associated with “a measure of sanction before imprisonment, instead of imprisonment, as an interlude during imprisonment (temporary release) and after imprisonment” (Durnescu, Enengl and Grafl, 2013:21).

While defining ‘supervision’ is not straightforward, for this REA we have adopted the definition used in the National Offender Management Model (NOMS, 2006: 26):

*“Effective supervision requires more than common sense. Securing not only compliance but also active co-operation in rehabilitation from both offenders and providers, within a correctional setting, requires a high level of knowledge and skill. . . . the bedrock of supervision is the ability to **form and maintain a trusting working relationship** with the offender and through it to model pro-social behaviour and attitudes.”*

In recent years several reviews have examined the empirical evidence-base underpinning supervision. Dowden and Andrews (2004) focused on the ‘responsivity’ element of the Risks, Needs, Responsivity model and undertook a meta-analysis of the importance of staff

practice in delivering effective correctional treatment. Reviewing studies up until 1998 they found that the following elements of core correctional practice were associated with statistically significant reductions in rates of re-offending:

- relationship factors;
- skill factors;
- effective reinforcement;
- effective disapproval;
- problem solving;
- structured learning; and
- effective modelling.

However, Trotter (2013) questioned whether all studies in the meta-analysis actually focused on routine community-based supervision. Trotter's (2013) systematic review asked 'What is the impact on offender recidivism of different worker skills and practices used by supervisors in the one-to-one supervision of offenders on probation or other community-based orders?'. He identified eight studies, all of which found that when probation officers use evidence-based practice skills, their clients have lower recidivism rates. In addition, all but one of the studies showed a significant difference between the recidivism rates of those supervised by more and less skilled officers. Relevant skills included pro-social modelling and reinforcement, problem solving and cognitive techniques.

Trotter was uncertain about the impact of worker-client relationships, drawing a tentative conclusion that trust and strong communication seemed most effective. Shapland et al. (2012) explain how the purpose of probation is often malleable and reliant on a number of complex socio-economical, cultural and political influences, meaning that the application of a static framework is problematic. This complex process is thought to be enhanced by the adaptation of techniques that encourage engagement, the formation of relationships and promotion of offender agency (Maruna, 2001).

Many argue that the quality of the relationship between offender and practitioner is pivotal in reducing recidivism (e.g. McNeill, 2006) with a need for mutual understanding, especially when interpreting an offender's life circumstances (Ward and Maruna, 2007). Practitioner characteristics including warmth, empathy, likability and respect are fundamental in the formation of relationships, as they encourage a deeper connection (Trotter, 1990). Relationships built on these foundations also enrich the delivery of practice and promote greater levels of compliance (Raynor et al., 2012; Ugwu-dike, 2010). Other studies that explore quality of supervision have shown that practitioners are less inclined to employ cognitive behavioural approaches such as prosocial modelling (considered a key contributor to behaviour change), despite it being a valuable component of social learning theories (Bonta et al., 2008).

The largest quantitative study of offender supervision in the UK in recent years was the Offender Management Community Cohort Study (OMCCS), a UK based longitudinal study measuring the reoffending rate among offenders aged 18 or over (n=2,919). Wood et al. (2015) inferred that frequent meetings between offenders and offender managers were less significant in reducing offending compared with other aspects of case management such as effective absence monitoring. As well as closely monitoring missed appointments, particularly in the early stages of an order when the propensity to offend is increased, the authors suggest that "fewer, longer meetings between offenders and Offender Managers, monitored for quality" could improve practice outcomes.

1.2. Remote supervision and technology

The proliferation and advances in technology have revolutionised the way individuals connect with one another both socially and professionally, with the majority of occupational settings having been transformed. This shift has resulted in what experts have described as the 'information age', a period in history where the economy is based on technological advances and a major change to the way society operates (Carr, 2017). In the information age, knowledge and efficiency assume superiority with technology being the enabler (Phillips, 2017).

This paradigm shift has led providers of probation globally to become more attuned to technologies that enhance operations in pursuit of more smart and efficient ways of working (McGreevy, 2017). However, despite this increased interest in technology, advances in this field have remained slow.

A potential driver of technological innovation in probation in Europe and North America is the rapid growth in the use of community sentences that has resulted in increased pressure on criminal justice agencies (Beyens and McNeill, 2013; McGreevy, 2017). In the United States in 2013 it was estimated that 689,900 adults were under correctional supervision, a figure which has continued to rise (Bureau of Justice Statistics, 2018). This trend has also been witnessed in the UK where the probation service's total annual caseload increased by 32 per cent between 2001 and 2006 (National Audit Office, 2008). This increase in demand has resulted in the transformation of probation in the pursuit of greater efficiency and the appointment of new providers to deliver high quality at improved value (House of Commons Justice Committee, 2018).

In the UK, policy change has also placed greater emphasis on technology. England and Wales has seen radical reform of the criminal justice system. *Transforming Rehabilitation: A Strategy for Reform* (Ministry of Justice 2013) described the Ministry of Justice's intention to introduce a widespread programme of competition for probation services including regional Community Rehabilitation Companies (CRCs) taking responsibility for low and medium-risk offenders in the community. Supervision of high-risk offenders was moved to a new National Probation Service (NPS).¹ The Offender Rehabilitation Act 2014 extended the use of post-custody supervision to prison sentences under 12 months (often referred to as 'short sentences'). A stated aim of the reform programme was to encourage greater innovation in the delivery of offender management (Fox and Marsh, 2016).

Remote supervision is often concerned with the supervision of low risk offenders who are less likely to require intensive supervision and can be successfully managed in the community (Barnes et al., 2010; Phillips, 2017). Remote supervision typically includes a device, either fixed or mobile, that allows service users to access information, receive updates and maintain communication with their assigned responsible officer. In its simplest form remote supervision may refer to the use of telephone communication as a supplement to one-to-one sessions, although technological advances have increased the possibilities in this area. In the USA, examples include the use of kiosk machines that allow service users

¹ In June 2014, the 35 self-governing probation trusts were replaced by the new public sector NPS, which has seven divisions, and 21 CRCs owned by eight organisations, each different in constitution and outlook. The NPS advises courts on sentencing all offenders, and retains those offenders who present a high or very high risk of serious harm or who are managed under Multi-Agency Public Protection Arrangements (MAPPA). CRCs supervise most other offenders presenting a low or medium risk of serious harm – these cases are allocated to them post-sentence by the NPS.

to check in with probation staff using a handprint or finger scan. Such machines may issue appointment dates as well as other functions such as the ability to report and/or upload information as well as take part in traditional face-to-face meetings (Jannetta and Halberstadt, 2011; McGreevy, 2017). Deployments of technology in the UK have typically taken the form of electronic monitoring to enhance surveillance work, focusing on themes such as control, monitoring and punishment (Seiter and West, 2005). With less emphasis being placed on exploring their potential to perform a more rehabilitative function (Nellis, 2013), such uses of technology are outwith the definition of remote supervision used in this REA, so they were not eligible for inclusion.

1.3. Delivering outcomes for service users

In terms of delivering outcomes for service users, evidence suggests that technology in probation practice is beginning to adopt a more rehabilitative stance. Hucklesby (2008) supports this notion by proposing that electronic monitoring, a device typically associated with surveillance work, may have possible benefits for achieving offender outcomes due to its potential to contribute towards personal and social development.

The extent of this was tested in a randomised control trial in the German criminal justice system comprising of incarcerated individuals, some of whom were granted electronically monitored early release preparation (Schwedler and Woessner, 2017). The study sought to examine the psychosocial and psychological differences between the two groups. Results showed that those subject to electronic monitoring upon release were more likely to report an experience conducive to rehabilitation – they were more likely to display law-abiding traits, make lifestyle changes and benefit from heightened feelings such as emotional stability, independence and autonomy. Not only did they benefit from enhanced rehabilitation, but those in the treatment group were less likely to take part in deviant acts and more likely to internalise law abiding behaviour.

Other studies have sought to explore the links between electronic monitoring and welfare dependency, leading to a wider debate around the application of the technology (Andersen and Andersen, 2014). This seemingly more positive outlook on the utility of electronic monitoring may have significant implications for the development of supervision practice (Payne, 2014).

For some service users, low levels of literacy can raise significant barriers when they are required to interpret complex information. The use of technology could, when used correctly, provide a vehicle for individuals to gain support in a way which responds to their preferred method of learning. Service users may be more likely to relate to material and content which is simplified, thus amplifying their capacity to interpret and engage in their rehabilitation (Clark and Lyons, 2004). Evidence suggests that tailoring rehabilitative support to meet the needs of individuals has the power to aid supervision practice by enhancing dialogue and discussion (Morris and Kaur Bans, 2018). By offering a range of interactive, animated and visual resources, information may be presented in a way that is user friendly rather than standardised plain text (Mayer, Heiser and Lonn, 2001). Displaying information in such fashion may prove valuable when aiming to increase rapport and evoke positive responses, especially from those who possess learning difficulties and/or reduced comprehension capabilities (Morris and Kaur Bans, 2018).

1.4. Advantages for providers

Although use of technology has often centred around increasing efficiency and expected financial advantages (HM Prison and Probation Service, 2017), studies have looked to unearth its ability to improve engagement and compliance (McGreevy, 2017). Achieving service user engagement is critical to effective supervision and therefore valuable for providers. Engagement is often poor when sessions are unable to fit around a service user's lifestyle and responsibilities. It is common for service users to work atypical hours, have care responsibilities or have to travel a significant distance to attend appointments. Technology responds to these issues by offering a more practical and flexible approach that is less likely to impact on daily routines.

Benefits have been reported in the USA, where the use of kiosks in some jurisdictions has been linked to enabling correctional services to achieve rates of compliance of almost 100% (Bauer et al., 2016). Kiosks are believed to increase the likelihood of an individual fulfilling their obligations by allowing them to interact more flexibly. Increasing the convenience and accessibility of probation, rather than forcing individuals to endure fixed and rigid appointments discordant with compliance, meant they were less likely to violate their order (Ahlin et al., 2016; DeMichele and Payne, 2009).

Probation agencies also report advantages of remote and technology-enabled supervision. Probation workers often spend a considerable amount of time traveling to conduct home and prison visits as well as other in-person sessions. In instances such as these, adopting technology may complement more timely and efficient working. For example, service users vary considerably in terms of their criminogenic and practical needs. It is therefore important to ensure the right level of supervision is applied when allocating resources and managing workloads (Jannetta and Halberstadt, 2011). Remote supervision technology enables probation staff to work more effectively, by allowing them to deploy more intensive one-to-one supervision to those who pose greater risk and have more entrenched needs (Bauer et al., 2016). Using remote supervision in this way may mean that probation staff could manage those further along in the rehabilitation journey more appropriately, by avoiding more time-consuming face-to-face sessions that may actually increase recidivism (Wood et al., 2015).

Other benefits of remote supervision have been reported in New Zealand where 3,000 probation staff were given access to smartphone technology to understand its effect on worker productivity (Fagan, 2017). An initial four-month pilot followed by a larger study including 100 members of staff received positive feedback, with an overwhelming amount of support for the smartphones. It was reported by staff that the smartphones improved efficiency by allowing them to access case information, review notes, manage alerts and view calendars on the go. In addition, the smartphones were unaffected by system failures due to being separate from the main IT system meaning staff were able to access the integrated offender management system with greater ease. This enabled staff to work without disruption and promoted less reliance on desk-based working. The results from the pilots led to full roll out with further development expected in order to enhance integration with current standards and procedures.

1.5. Limitations

It is important to note that while the examples given in sections 1.3 and 1.4 suggest a number of benefits associated with the use of technology in supervision, they fail to provide

robust evidence regarding its impact on reoffending and related outcome measures, which was the focus of this review.

Despite the potential benefits of the use of technology in supervision, a number of criticisms are apparent in the literature. Some have suggested that technology may depersonalise therapeutic elements of supervision and diminish the humanising components on which it depends (Morris and Kaur Bans, 2018). This could prove counterproductive given that the contemporary literature on supervision emphasises the importance of relationships, connections and bonds between practitioner and service user (Shapland et al., 2012). Reflecting this literature, the HMI Probation (2018) standards framework for inspecting probation services includes the following key question and prompts:

- 1.1.3 Does the current operating model support effective service delivery, meeting the needs of all service users?
 - a) Does the operating model support meaningful contact and continuity of contact with service users?
 - b) Does the operating model allow for personalised approaches with service users, taking account of diversity factors?

Furthermore, an over-reliance on technology could prove problematic should the systems in place be prone to malfunction, connection issues or other IT related problems. Such occurrences have already caused severe disruptions to providers following the government's *Transforming Rehabilitation* programme (National Audit Office, 2016). Complications may also arise from data protection issues and reforms to information sharing legislation to which probation is often sensitive (Carr, 2017).

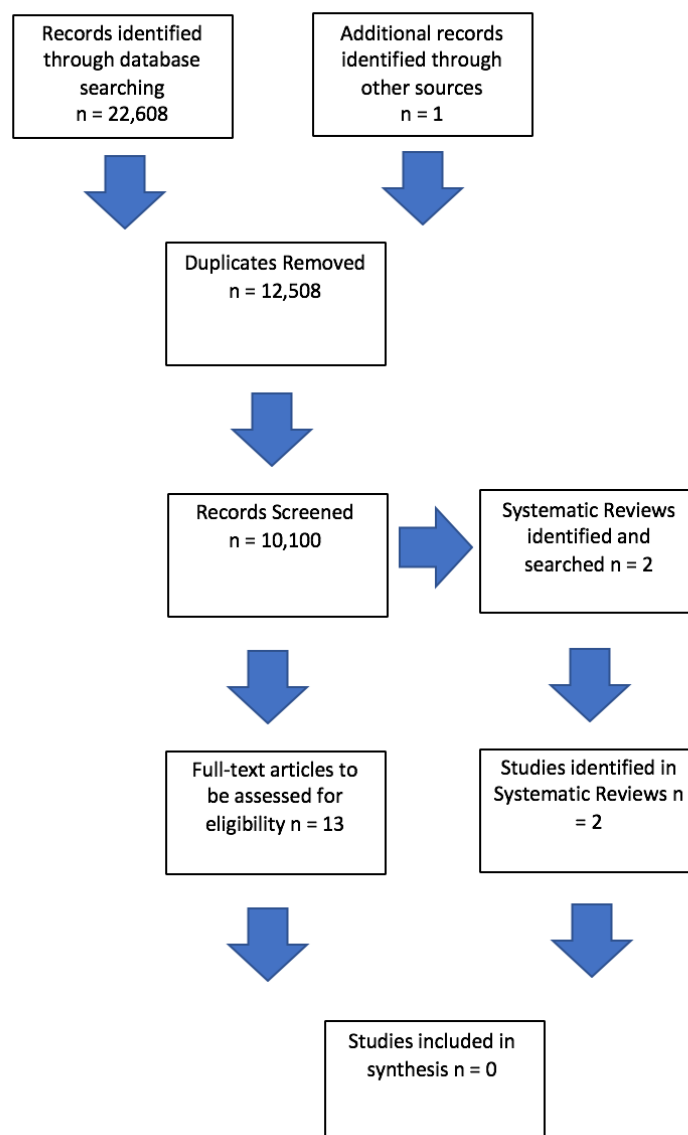
1.6. Summary

The use of technology in supervision has become an area of focus despite its modest uptake in comparison to other sectors such as health (Hollis et al., 2016). Some authors have noted that the evidence base is limited, with research in this area having failed to elicit conclusions or clearly articulate its role in reducing reoffending (Hannah-Moffat et al., 2009). There has consequently been a call for more evaluation work to build a larger body of evidence that informs direction and enables probation to adapt and thrive in the information age (Bauer et al., 2016). The current review therefore provided the opportunity to identify the published and up-to-date research on this subject.

2. Findings

A systematic process was used to identify the most robust and relevant evidence (published in English after 2006 in the UK and other OECD countries) on the effectiveness of remote supervision approaches and emerging new technologies in the context of a supervisory relationship with probation service users. At the first stage, 22,609 records for screening were identified using clearly defined inclusion and exclusion criteria (see Annex A for full details of the methodology). Ultimately no evidence meeting the criteria for inclusion in the review was identified, and therefore we were unable to synthesise the evidence base, either by narrative or statistical (i.e. meta-analysis) methods. The PRISMA flow diagram below provides a diagrammatic outline of the REA process.

Figure 1. PRISMA flow diagram



2.1. Search and initial screening process

In this section we explain the PRISMA flow diagram shown in Figure 1. We describe the process by which records were screened and summarise the key reasons for record exclusion. While this section describes our methodology, the detail serves to explain our findings, and is a basis for the conclusions which follow.

Following the removal of duplicate records (n=12,508) imported from the database searches we were left with 10,101 records to screen. Screening followed a three-step process, and was done using Mendeley Desktop (reference management software):

1. In the first instance we *scanned records by journal*. This enabled us to discard records based on the relevancy of the journals in which the articles were published. Records contained in journals which were clearly not related to criminal justice could be easily identified and screened out. Careful attention was paid to records contained in interdisciplinary journals, with only unambiguously irrelevant publishers and those not in English being excluded.
2. The search then focused on *record titles*. During this stage only records whose content could be distinguished by the title as failing to conform to the inclusion criteria were removed. Approximately 75% of documents were excluded at this stage, including records with unrelated topics and anomalies produced by the search string. A significant number of records were removed on the basis of the study's participants. For instance, studies which focused on youth, child, juvenile and adolescent participants were discarded. Furthermore, screening by title allowed us to make judgements about studies that lacked a criminal justice focus. These included studies set within the context of healthcare which were recognisable due to them often featuring in practice, medical, nursing and public health journals and referring to participants as patients and/or clients, with no evidence of an offender population. In addition, a substantial number of records retrieved through searches were clearly based on policing practices such as crime prevention, investigation, detection, and intelligence and surveillance operations. In most cases documents containing the groups above were removed.
3. The remaining records underwent a subsequent *screening of abstracts*. This allowed us to access more detailed study information and develop a more informed interpretation when excluding results. Reasons for exclusion included those outlined in point 2 above relating to subject attributes and field of enquiry. It was also common for abstracts to state the methods used by the study, many of which could not be categorised at levels 3, 4 or 5 on the Maryland Scientific Methods Scale (see Annex A, Table A1). In addition, screening by abstracts revealed a number of discussion papers, theoretical perspectives, literature reviews and other non-empirical evidence for removal.

Overall, the records retrieved by the searches included a large volume of literature describing the electronic monitoring of offenders. Results in this field generally examined electronic monitoring as a stand-alone practice that focused on the control, tracking and monitoring of offenders. As these uses of electronic monitoring are not principally aligned with the definition of the supervisory relationship adopted by this bulletin, these records were excluded.

Many records also centred on aspects of the criminal justice system delivered separate to probation, such as prisons, or upon psychiatric and mental health treatment support for offenders more generally. In these cases, the studies were subject to a more thorough investigation by means of a full-text screening. Typical reasons for exclusion at this stage included a lack of reference to probation practices or the supervision of offenders in the community. Close attention was paid to interactions and communications between service user and practitioner, i.e. whether the study clearly described the use of technology in the context of a supervisory relationship which was consistent with the definition we have given in this report.

2.2. Full-text screening of remaining articles

Following the initial title and abstract screening process, 15 studies remained for potential inclusion, two of which were identified from systematic reviews. It was unclear at this stage whether any of the studies should be excluded, and therefore each was read in full by two researchers and assessed against the exclusion criteria. The remaining articles were discussed in depth until agreement was reached by both researchers about whether they should be excluded. Several studies presented a degree of ambiguity and failed to provide enough detail for us to make a clear judgement about the exclusion criteria. In these instances the articles were discussed until a decision could be made on the probability of the exclusion criterion being satisfied, and in some instances the opinion of a third researcher was sought. Subject matter experts were consulted during the process to help calibrate a number of general judgements about the application of exclusion criteria.

It was necessary to distinguish between clinical and criminal justice interventions, as well as how these were delivered. For example, one study by Campbell et al. (2014; and follow-up study by Lee et al., 2017) explored the use of web-based technology known as the Therapeutic Education System (TES). TES incorporated interactive modules for substance users to complete either onsite or remotely. The Campbell et al. (2014) study was aimed at outpatients, of whom only a fraction of the sample (176/507) were in contact with the criminal justice system. The nature of this contact described by the article was ambiguous with no reference to the intervention coexisting with the core components of supervision as stated by NOMS (2006).

Similarly, Morgan, Patrick and Magaletta (2008) discussed 'linking with offenders' within the context of a therapeutic relationship to deliver tele-mental health, but again we deemed that this was not an example of remote supervision according to our definition. Similar issues were determined to be present in the article by Wimberly et al. (2018) which described continuing care for cocaine users and measured recidivism. However the care was provided by an outpatient program, rather than being in the context of supervision. In general, the absence of features deemed integral to the supervisory process (in line with the definition adopted by this review) was a common reason for the research team to further exclude from amongst the 15 papers.

A small number of papers discussed working with offenders in the community, but their focus was that of measuring the effects of technology adoption on service delivery, efficiency and the feasibility of the intervention. Examples include King et al. (2017) and Lee et al. (2017), both of which highlighted the use of technology and its acceptability amongst the offender population. Although these studies were interesting and could potentially link to a wider discussion about the adoption of technology by probation services, they did not measure

outcomes either in terms of reoffending or intermediate outcomes pertaining to the individual service user. One other study (Elison et al., 2016) described the use of a mobile-enabled app in the context of substance misuse. While this could be understood to be an intermediate outcome of interest, the study was ultimately excluded from further analysis due to the study design adopted.

2.3. Articles which were almost eligible for inclusion

The three studies which came closest to meeting the criteria for inclusion were as follows:

- Lerch et al. (2017). A computer based Motivational Assessment Programme to Initiate Treatment (MAPIT).
- Ormachea et al. (2017). A tablet based risk assessment to enhance the precision and accuracy of risk information.
- Vasilijevic et al. (2017). Automated mobile telephone calls to capture dynamic risk factors

The application of the technology is described below along with a description of the key reasons for study exclusion.

2.3.1. Intervention

Each study described a technology which satisfied the remote and/or new technologies criterion outlined in the original protocol for considering studies. All three technologies could be used in the absence of a supervising officer, two of which (the computer and mobile phone) could also be used remotely.

- *A computer based Motivational Assessment Programme to Initiate Treatment (MAPIT)*. To encourage and motivate service users under community supervision into substance misuse support programmes and/or engagement in a broad range of treatments including self-help, group sessions, detoxification, medication or other services.
- *A tablet based risk assessment to enhance the precision and accuracy of risk information*. The use of an electronic tablet to conduct more accurate neurocognitive tests to increase objectivity, precision and scalability in conjunction with current risk assessment structures. Device enhances the accuracy and objectivity of assessments of dynamic risk to predict offending and enable providers to modify supervision intensity accordingly.
- *Automated mobile telephone calls to capture dynamic risk factors*. Enables probation staff to perform daily assessments of acute dynamic risk factors in paroled offenders through the use of automated phone calls. The use of automated phone calls allowed for self reporting of stress-related variables associated with offending and enhanced predictions of recidivism.

2.3.2. Participants

Each of the three studies described a sample of adults currently under probation and/or correctional supervision in the community. Participants had recently commenced their community supervision having been released from prison or having received a community sentence. In one study, the intervention was limited to those who had reported substance misuse in the previous 90 days (Lerch et al., 2017). The study by Ormachea et al. (2017)

focussed on probationers more generally and did not state a specific target group. The final study focused on parolees on release from 13 different open and closed prisons (Vasiljevic et al., 2017) in Sweden (the other two studies were undertaken in the United States).

2.3.3. Study design

All three studies randomised the allocation of cases to either a control or treatment group, and can therefore be classified as examples of level 5 on the Maryland Scientific Methods Scale. Sample sizes ranged from 108 to 360 individuals.

Although we did not undertake a quantitative synthesis of the three studies, we assessed them for risk of bias in accordance with the REA protocol. Using Cochrane risk of bias criteria (Cochrane Methods, 2018), each study was judged to be at risk of bias on at least one of the criteria. This, however, is a common finding amongst randomised trials in the social sciences, which are judged against criteria developed in more controlled clinical trials. Furthermore, the risk of bias judgements for the three studies did not imply a large reduction in the confidence of their observed effects.

2.3.4. Outcome measures

The primary outcome measure of interest in this review was reoffending. We found that the two studies that focussed on enhanced risk information sought to measure the effectiveness of the intervention technology in predicting reoffending. For example, the tablet was expected to obtain more precise and objective risk information when compared to less accurate conventional methods that rely on face-to-face interactions (Ormachea et al., 2017). Similar outcome measures were also used to assess the effectiveness of automated telephone calls (Vasiljevic et al., 2017). In this case the effectiveness of the intervention was judged based on its ability to predict recidivism using a number of measures relating to an individual's acute dynamic risk factors. This information was gained using a telephone keypad and voice recorder, with those in the treatment group also receiving feedback based on their score. Responses were then compiled in a report for their probation officer. Outcome measures in this study focused on the potential for acute dynamic risk information to predict recidivism and improve the monitoring of parolees during their transition back into society.

The study by Lerch et al. (2017) measured treatment initiation (two or more days of any treatment involvement) in the context of substance-using individuals at both two month and six month follow-up intervals following the intervention. Further outcome measures related to substance misuse including self-report measures of heavy alcohol, marijuana or hard drug use.

2.3.5. Reasons for not including the three studies in a final synthesis

While each of the three papers represents a valuable contribution towards advancing knowledge in their specific areas, and clearly met a number of the criteria for inclusion, we concluded that they were not eligible for further synthesis. Based on the information presented in the papers we determined that none of the three provided explicit evidence of technology use within the context of a supervisory relationship which was consistent with NOMS (2006) definition:

*“Effective supervision requires more than common sense. Securing not only compliance but also active co-operation in rehabilitation from both offenders and providers, within a correctional setting, requires a high level of knowledge and skill. . . . the bedrock of supervision is the ability to **form and maintain a trusting working relationship** with the offender and through it to model pro-social behaviour and attitudes.” (NOMS 2006:26)*

Although Lerch et al. (2017; MAPIT) provided a rehabilitative perspective, the role of the intervention in the supervision process was unclear. It is, however, feasible that MAPIT may have positively benefited supervision practice. The studies by Vasiljevic et al. (2017) and Ormachea et al. (2017) described technologies that were found to enhance risk assessment, although neither made explicit the extent to which the technologies were embedded within supervision. For example, the studies did not indicate their relevance to the fundamental characteristics of offender supervision such as consolidation, pro-social modelling, relationship building, developing trust and challenging behaviours.

We also considered each of the three studies with regard to the Home Office (2004) key areas or pathways² to supporting the rehabilitation of offenders, in order to evaluate the study’s relevance to intermediate outcomes which may lead to reductions in reoffending. Each of the interventions described above enhanced aspects of offender management, but the centrality of the use of technology in the rehabilitation of offenders is uncertain.

MAPIT (Lerch et al., 2017) provided the clearest link to a single pathway, finding computerised motivational interviewing to be more effective in encouraging service users to participate in drug treatment in comparison with conventional face-to-face interactions. This clear association with a single pathway can be considered an example of an intermediate outcome. Furthermore, MAPIT sessions utilised a range of goal setting, motivational and coping strategies as well as other social support techniques conducive of rehabilitation. Approaches such as these demonstrate attempts to change attitudes, thinking and behaviour, and adhere to the core aims of supervision as stated by NOMS (2006). While this approach therefore echoed many of the active ingredients of supervision, it was still judged not to be an example of technology usage in the context of supervision.

The use of technologies studied by Vasiljevic et al. (2017) and Ormachea et al. (2017) relate less clearly to the pathways, and we are therefore less certain about whether these studies link to intermediate outcomes. It is likely that the availability of dynamic risk information could aid probation officers in their work, for instance by helping them to target interventions according to changes in dynamic risk among their caseload, and by responding to situations where reoffending is likely to be high. However, neither study makes explicit how this information is used by probation officers beyond simply predicting recidivism, nor how the intervention provides a rehabilitative focus to supervision aligned to one or more of the pathways.

² Accommodation; education, employment and training; mental and physical health; drugs and alcohol; finance, benefit and debt; children and families of offenders.

2.4. Cost-effectiveness

Despite the logical assumption that the use of technology in supervision can be cost-effective (e.g. Vasiljevic et al., 2017), this review found almost no trustworthy empirical evidence to support this assumption.

One exception was the study conducted by Cowell et al. (2018), which evaluated the cost-effectiveness of MAPIT (Lerch et al., 2017), directly comparing it with motivational interviewing (MI) delivered by a probation officer, and standard supervision. They found MAPIT to be 'a promising and potentially cost-effective option relative to MI for motivating substance-involved probationers to initiate treatment'. In the context of the randomised study, they found MAPIT to cost \$79.37 per participant, whereas MI cost \$134.27 per participant. The authors concluded that MAPIT represented a relatively small incremental cost compared to community supervision. Their analyses showed that MAPIT cost \$6.70 per percentage point increase in the probability of a probationer initiating treatment.

They noted, however, that this finding did not hold when the outcome measured was *initiating formal treatment*, rather than *initiating any treatment*. Furthermore, the study was undertaken in two US cities, and therefore the results cannot be assumed to generalise to other settings and contexts. Cowell et al. also noted a high investment of resources spent to engage the probationer population throughout the study. For example, in both the treatment and control groups a lot of time was spent on appointment reminders. The authors suggest that this level of effort might not be observed or achievable in real-world settings. This may therefore lower the cost of implementing MAPIT, but also potentially the effectiveness of the intervention.

The paper offers a helpful analysis of some of the considerations associated with the use of technology in supervision, and the findings provide some support for the assumption that the use of technology in probation supervision can be cost-effective. Cowell et al. also outline some of the considerations associated with technology adoption which probation agencies should consider. These include start-up costs (e.g. software, equipment, staff training) and maintenance costs, such as those associated with renewing equipment and licensing.

2.5. Summary of findings

Despite initial searches identifying 22,608 articles, the screening process reduced the literature to 15 articles. Of these, the three studies outlined above stimulated greatest debate and may therefore highlight parameters for future approaches. Based on the details provided by the articles we concluded that none of them produced examples of the role of technology in supervision practice as we understand it (NOMS, 2006). We therefore decided to perform no further narrative or statistical syntheses on these articles. We have, however, described them above. Our overall finding therefore is that there is a dearth of evidence with regard to the effectiveness (and cost-effectiveness) of remote supervision and new technologies in managing probation service users.

Due to this lack of an evidence-base, we conducted a further thematic review examining the use of technology in a different area of public sector delivery. Healthcare was selected due to some commonalities with probation and a strong tradition of rigorous evaluation studies. The findings from this thematic review are set out in Annex B. In summary, four systematic reviews were identified where a technological solution either completely or partially replaced standard person-to-person treatment. The studies did not find that these technologies

produced better outcomes, and there was insufficient evidence to judge whether *enhancing* human involvement was more or less effective at delivering outcomes than *replacing* human involvement. While none of the studies contained an economic analysis, it is possible that technology can deliver cost savings without delivering worse outcomes for some users, particularly those in more rural/remote locations. The applicability to criminal justice, however, needs to be approached with caution, not least as the nature of the engagement of service users/clients differs between the contexts.

3. Conclusion

The REA on which this bulletin is based sought to evaluate and synthesise existing empirical evidence of the effectiveness of remote supervision approaches and emerging new technologies to manage and rehabilitate probation service users. Given the paucity of available evidence which meets the inclusion criteria of the REA, it may be understood as an example of an *empty review* (Yaffe et al., 2012). Empty reviews typically refer to systematic reviews that find no studies eligible for inclusion; it has been suggested that this may be due to the reviewed topic area being immature (Cooper, cited by Yaffe et al., 2012).

However, the process used in this project is a solid basis for further review as more evidence becomes available. We can also make conclusions about what needs to happen next. Given the current paucity of evidence, there is a need for new methodologically robust evaluations to be conducted. Rigorous, counterfactual impact evaluations would be particularly useful (and there is potential learning from healthcare evaluations – see Annex B). Among evaluators who prefer quantitative approaches to impact evaluation, the ‘trustworthiness’ of an evaluation design is discussed here in terms of its ‘validity’. ‘Validity’ refers to the correctness of inferences about cause and effect (Shadish et al., 2002).

It would be advisable for impact evaluations to be preceded by studies to assess the feasibility of undertaking such an evaluation. Feasibility studies are often organised around testing four forms of validity in order to reach a balanced conclusion as to whether or not an impact evaluation is viable:

- **Statistical conclusion validity** is concerned with whether the presumed cause (the intervention) and the presumed effect (the outcome) are related (Farrington, 2003). The Government Social Research Unit (2007) notes that the history of evaluating social programmes in North America and the United Kingdom suggests that the effects of social programmes are often modest. When we combine this with the fact that individuals subject to social interventions tend to be relatively heterogeneous the implication is that samples in programme evaluations will often have to be large in order to detect programme impacts. For these reasons it is advisable when planning and reporting on quantitative evaluations to analyse how much power one has to detect an impact of a given size, allowing for the sample size, its characteristics and the statistical tests that will be used during analysis (Cook and Campbell, 1979; Farrington, 2003).
- **Internal validity** refers to whether the evaluation can demonstrate plausibly a causal relationship between the treatment and the outcome (Robson, 2011). In other words, is the relationship between an independent and dependent variables a causal relationship (Cook and Campbell, 1979). Once it is established that two variables covary we need to decide whether there is really a *causal* relationship between the two and in which direction causality flows. A number of possible threats to internal validity have been identified (Cook and Campbell, 1979). These threats can confound the presence of a causal relationship, either masking a relationship that does exist, or leading to the false conclusion that there is a causal relationship when one does not exist. A feasibility study should consider the potential for these threats to materialise and propose preventative and contingent measures in response.

- **Construct validity** is concerned with whether we are measuring what we think we are measuring (Robson, 2011) or, more formally, the validity with which we can make generalisations about higher order constructs (Cook and Campbell, 1979). It is to recognise that when evaluators examine the relationships between variables, they move from the specifics of what they are measuring to an abstract level where relationships between variables are turned into theoretical constructs. This might be because they are examining the relationships between variables in order to test a theory or just because it is easier to describe their findings using generalised concepts rather than having to detail the relationships they have found between each of their variables. A common problem, identified by Cook and Campbell, is that applied researchers concentrate more on achieving high construct validity of *effects* than of *causes*. Thus great care goes into measuring outcomes such as 'recidivism' or 'employment' but this is often accompanied by a restricted interest in understanding and 'capturing' the intervention. Ensuring construct validity therefore requires the intervention to be clearly defined, appropriate measures of the intervention to be developed - which may involve the use of mixed methods - and for the intervention to be held constant during the evaluation.
- **External validity** refers to whether results from the evaluation can be generalised, either beyond the group being evaluated, or to different settings and situations. More formally it is the validity with which we can infer that a causal relationship that we observe during the evaluation can be generalised across different types of persons, settings and times (Cook and Campbell, 1979). A common challenge is deciding whether findings from an evaluation of a pilot will hold when an intervention is tried at scale.

To summarise, avoiding the possibility of drawing false positive or false negative conclusions about causal hypotheses is the essence of internal validity and statistical validity. Being able to make generalisations is the essence of construct and external validity. In reality, a feasibility study for a counterfactual impact evaluation will tend to concentrate more on the first two types of validity because it is widely accepted that such evaluation designs offer only limited potential for generalisation.

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Annex A: Methodology

We completed the REA in order to assess the effectiveness of remote supervision and/or new technologies in managing probation service users, systematically searching for and evaluating the evidence.

We undertook an initial search to identify all the relevant studies published in English after 2006. We then classified the returned articles by evaluation type and design ('classification of study designs' below). Once we had reviewed the evidence returned by our searches, we considered appropriate methods of quality assessment and data analysis, before undertaking further analysis.

Criteria for considering studies

Types of interventions

Only studies that tested the effect of remote supervision and/or new technologies in managing probation service users were eligible for review. Remote supervision includes a number of practices such as:

- the use of telephone or web-based technologies, either audio or audio-visual, that allow probation staff and service users to interact while in different locations;
- automated telephone reporting; and
- automated website/internet-based reporting.

Potentially, some of these approaches can be combined, for example where service users report at a 'kiosk' located in a probation office that verifies their identity and asks questions that would typically be asked by a probation officer during a face-to-face visit.

New technologies include, but are not limited to

- telephone conferencing;
- video conferencing;
- apps that are used by probation staff to access case files and other information more easily or to plan appointments more efficiently;
- apps that are used by service users to support aspects of their rehabilitation; and
- kiosks.

Types of participant

Only studies involving participants under probation supervision were eligible for inclusion, including those released from prison under probation supervision and those given a community sentence where probation supervision is a component. Since offenders in England and Wales under the age of 18 are in the care of youth offending services, only studies where some or all of the participants were aged 18 and above were included.

Types of outcome measure

The primary outcome measures of interest were measures of recidivism such as arrests, convictions (binary, frequency, severity), or breaches of condition (e.g. recalls to custody or return to court). Some secondary or intermediate outcomes were also eligible for inclusion.

There is no definitive list of intermediate outcomes, and this review was informed by the seven pathways to reducing re-offending set forth by the Home Office (2004), and still influential in shaping thinking on rehabilitation:

- Pathway 1: Accommodation
- Pathway 2: Education, employment and training
- Pathway 3: Health (physical and mental)
- Pathway 4: Drugs and alcohol
- Pathway 5: Finance, debt and benefit
- Pathway 6: Children and families
- Pathway 7: Attitudes, thinking and behaviour

Types of study design

The selection of studies was limited to outcome evaluations that adopted experimental and quasi-experimental designs, and studies using unmatched comparison groups. Studies with these research designs correspond to levels 3 to 5 on the Maryland Scientific Methods Scale (Sherman et al., 1997) adapted for reconviction studies (Friendship et al., 2005: 7). The rationale for including Level 3 studies was the anticipated shortage of evaluations with methodologically rigorous designs across different topics.

Table A1: Maryland Scientific Methods Scale adapted for reconviction studies

<i>Standard</i>	<i>Comparison</i>	<i>Description</i>	<i>Methods</i>
<i>Level 1</i>	No comparison	Reconviction rate is reported for intervention group only	Before and after study
<i>Level 2</i>	Comparison with predicted rate	Actual and expected reconviction rates of intervention group are compared	Expected reconviction rates generated by Offender Group Reconviction Scale (OGRS)
<i>Level 3</i>	Unmatched comparison group	Reconviction rate of intervention group is compared with reconviction rate of an unmatched comparison group	Comparison of mean levels of reoffending
<i>Level 4</i>	Well-matched comparison group	Reconviction rate of intervention group is compared with reconviction rate of a comparison group matched on static (and dynamic) risk factors e.g. criminal history, gender	Propensity score matching; regression discontinuity
<i>Level 5</i>	Randomised control trial (RCT)	Reconviction rates are compared between intervention and control groups that have been created through random assignment	Randomisation

Settings and timeframe

Studies published in English after 2006 in the UK and other OECD countries were eligible for inclusion.

Search strategy

The following search strategy, using search keywords, was adopted to identify studies:

- electronic databases were searched for published studies;
- governmental and organisational websites were searched for grey literature;
- appropriate journals were hand searched; and
- reference lists from systematic reviews and meta-analyses were checked for additional, relevant studies.

The electronic databases searched were as follows:

1. ASSIA (Applied Social Sciences Index and Abstracts)
2. Criminal Justice Database
3. ERIC (Education Resources Information Center)
4. PsycINFO
5. PsycARTICLES
6. Scopus
7. Sociological Abstracts
8. Web of Science

The electronic databases each index a large number of journals, books and other sources, in many cases from a range of academic disciplines. For example, ASSIA indexes over 500 social science journals published in 19 countries, and Web of Science searches over 12,000 journals across science, social sciences, arts and humanities.

Several governmental agencies and organisations associated with criminal justice research were searched for reports and other grey literature.

1. UK Ministry of Justice
2. College of Policing
3. The Scottish Government
4. Correctional Services Canada
5. Australian Institute of Criminology
6. US National Institute of Corrections
7. Vera Institute for Justice
8. Washington State Institute for Public Policy

The *Probation Journal*, the *International Journal of Offender Therapy and Comparative Criminology* and the *Journal of Forensic Practice* were hand searched for relevant articles between 2007 and 2018.

Search keywords and terms

The following Boolean search string was used to search databases, and was adapted in order to search government and organisational websites (website searches were conducted using the technology-related key words specified in the third clause of the search string):

TITLE-ABS-KEY ((reoffend* OR *offend* OR probation* OR parol* OR desist)) AND TITLE-ABS KEY ((interven* OR supervis* OR license* OR monitor* OR support OR correct* OR justice)) AND TITLE-ABS-KEY ((kiosk OR remote OR app* OR techno* OR automat* OR phone OR telephone monitor* OR “electronic monitoring” OR electr* OR tag* OR GPS OR “global positioning system” OR RF OR “radio frequency”)) AND PUB YEAR > 2006

Search results

The ‘Results’ column in the table below shows the combined number of hits per keyword (including keyword truncations where applicable). Searches were conducted using single keywords derived from the Boolean search string, as the websites did not allow Boolean searching. Where possible, websites were searched using the appropriate filters (‘Filters Applied’). This allowed searches to be streamlined with greater precision than a broad default search. However there was variability across the websites in terms of their search capabilities, and some websites did not include this feature. In these instances broad default searches were used.

Table A2: Database search results

<i>Database</i>	<i>Results (applying 2006 - 2018 and English language filter)</i>
<i>ASSIA</i>	Title - 32 Abs - 1,464 Key Word - 13 Total - 1532
<i>Criminal Justice Database</i>	Title - 118 Abs - 2,742 Total - 2887
<i>ERIC</i>	Title - 9 Abs - 353 Total - 362
<i>PsycINFO</i>	Title - 80 Abs - 4,075 Total - 4182
<i>PsycARTICLES</i>	Title - 3 Abs - 162 Total - 189
<i>SCOPUS</i>	Title, Abs, Keyword - 6,078 Total – 6439
<i>Sociological Abstracts</i>	Title - 31 Abs - 2,077 Total - 2110
<i>Web of Science</i>	Title - 79 Topic - 4,270 Total - 4380

Table A3: Website search results

Website	Filters Applied	Search Method	Results
<i>UK Ministry of Justice</i>	Department Ministry of Justice Publications Type Impact Assessments Independent Reports Research and analysis	Search of key words: Kiosk, Remote, App*, Techno*, Automat*, Phone, Telephone Monitor*, Electronic Monitoring, Electr*, Tag*, GPS, Global positioning system, RF, radio frequency	101
<i>College of Policing</i>	None	No Key word search option, Systematic Review and College Published Research explored manually.	0
<i>The Scottish Government</i>	Topics Business, industry and innovation Public safety and emergencies Publication Type Research Findings Research Publications Statistics Publication	Search of key words: Kiosk, Remote, App*, Techno*, Automat*, Phone, Telephone Monitor*, Electronic Monitoring, Electr*, Tag*, GPS, Global positioning system, RF, radio frequency	242
<i>Correctional Services Canada</i>	Indigenous Offenders Correctional Operations Community Corrections Correctional Programs and Interventions Health and Mental Health Substance Abuse Offender Profiles and Forecasting Women Offenders	Search of key words: Kiosk, Remote, App*, Techno*, Automat*, Phone, Telephone Monitor*, Electronic Monitoring, Electr*, Tag*, GPS, Global positioning system, RF, radio frequency	29
<i>Australian Institute of Criminology</i>	None	Search of key words: Kiosk, Remote, App*, Techno*, Automat*, Phone, Telephone Monitor*, Electronic Monitoring, Electr*, Tag*, GPS, Global positioning system, RF, radio frequency	336

<i>US National Institute of Corrections</i>	Media Type: Document	Search of key words:	74
		Kiosk, Remote, App*, Techno*, Automat*, Phone, Telephone Monitor*, Electronic Monitoring, Electr*, Tag*, GPS, Global positioning system, RF, radio frequency	
<i>Vera Institute for Justice</i>	None	Search of key words:	85
		Kiosk, Remote, App*, Techno*, Automat*, Phone, Telephone Monitor*, Electronic Monitoring, Electr*, Tag*, GPS, Global positioning system, RF, radio frequency	
<i>Washington State Institute for Public Policy</i>	Criminal Justice: Adult Corrections Employment and Welfare Substance Abuse	Search of key words:	209
		Kiosk, Remote, App*, Techno*, Automat*, Phone, Telephone Monitor*, Electronic Monitoring, Electr*, Tag*, GPS, Global positioning system, RF, radio frequency	
<i>Urban Institute</i>	Crime and Justice	Search of key words:	1631
		Kiosk, Remote, App*, Techno*, Automat*, Phone, Telephone Monitor*, Electronic Monitoring, Electr*, Tag*, GPS, Global positioning system, RF, radio frequency	

Systematic reviews searched:

- Bewick, B.M., Trusler, K., Barkham, M., Hill, A.J., Cahill, J. and Mulhern, B. (2008). 'The effectiveness of web-based interventions designed to decrease alcohol consumption - A systematic review', *Preventive Medicine*, 47(1), pp. 17-26. **No studies met inclusion criteria**
- Kip, H., Bouman, Y.H.A., Kelders, S.M. and van Gemert-Pijnen, Lisette J.E.W.C. van Gemert-Pijnen (2018). 'eHealth in Treatment of Offenders in Forensic Mental Health: A Review of the Current State', *Frontiers in psychiatry*, 9(42). **Two studies identified for inclusion**

Selection of studies

All studies that were retrieved through the search process were imported into Mendeley, a specialist tool for screening records for inclusion in reviews. Mendeley is used to remove duplicates at the point of importation. The titles and abstracts of retrieved studies were screened to identify studies that met the exclusion criteria:

- **Language:** Not English.
- **Year of publication:** Before 2007.
- **Reporting evaluation:** Does not report an evaluation of an intervention.
- **Participants:** Participants were not offenders or in the care of the Criminal Justice System.
- **Age of participants:** Participants were aged below 18 years (studies with overlapping ages should be included).
- **Systematic review / meta-analysis:** Article is a systematic review or meta-analysis.
- **Context:** Technology was not used in the context of a supervisory relationship (as defined by NOMS (2006)).
- **Measure:** Study did not include a measure of reoffending or an intermediate outcome measure.
- **Study design:** Study design did not include a control or comparison group (i.e. was Level 1 or 2 on the adapted Maryland Scientific Methods Scale).
- **Sample size:** Contains less than 50 participants in the total sample.

Citations were screened by one reviewer and a second reviewer screened a proportion (20%) at random. Mendeley facilitates the logging of disagreements between reviewers so that they may be resolved through discussion and the involvement of a third reviewer if necessary.

The full-texts of studies which were not excluded were screened by two researchers and a third consulted when making final decisions on synthesis inclusion.

Methodological quality

Randomised studies were assessed for risk of bias using the Cochrane Risk of Bias tool (Cochrane Methods, 2018).

Annex B: Effectiveness of new technologies in delivering remote health interventions: A thematic review of evidence and its implications for the supervision of probation service users

Introduction

This annex sets out an additional thematic review of remotely delivered health interventions. Following an initial scoping exercise, we identified healthcare as an area that may offer a number of comparable features to those present in probation supervision. These include commonalities within the increasingly widespread use of technology-facilitated relationships between professionals and clients to deliver cognitive behavioural interventions to individuals. The healthcare sector also seeks to resource technology which promotes positive physical, social and psychological outcomes for its clients. In addition, the healthcare sector has a relatively well-developed and robust evidence base concerning the use of technology to facilitate professional/client interactions.

The aim of this additional piece of work was to understand the extent to which evidence from the healthcare sector might inform an understanding of the effects of the use of technology to manage probation service users.

1. Methodology

We adapted the original REA search terms to explore the evidence within a healthcare setting. To inform this search we used the findings from our REA to identify the key components of probation supervision including those likely to feature in the context of healthcare, such as the skills of the professional working with clients along cognitive, behavioural and affective dimensions (Smith et al., 2018). We were only interested in systematic reviews that focused on interventions that included a technological component which aimed to achieve outcomes related to either the service provider or service user. We distinguished between reviews in which technology allows the 'standard' person-to-person model to be delivered remotely and reviews where technology challenged the standard person-to-person model, for example where a computer replaces completely, partly or supplements the work of the professional.

The additional review was not the main focus of this report, and we therefore optimised the time available for literature searches (given the abundance of studies published in this area) by limiting our search to The Cochrane Database of Systematic Reviews (Cochrane, 2018), a repository for systematic reviews in healthcare. A researcher hand searched the database and used the following keywords to search for reviews that described the use of technology.

- Virtual reality
- Interactive
- Internet delivered
- Email
- App

- Multimedia
- Online, Video
- ICT
- Home Based
- Media-based
- Computer-based

The results of the keyword searches were then screened by title for those that included the provision of care to patients using technology. Additional words were added to the search where necessary to account for differences in terminology. Examples of this included 'telehealth', 'telerehabilitation' and other healthcare specific terms. If the review did not allude to the method of delivery in the title we assumed it to not involve technology or remote delivery, and we limited our search to prioritise recently published reviews. This decision was based on the premise that technology changes at a rapid rate and therefore some forms of technology may be outdated or no longer used.

Reviews that met the criteria were explored further by reviewing their abstracts, with particular attention given to reviews which focused on individuals experiencing psychological and psychosocial conditions likely to be similar to those faced by probationers. Relevant reviews included participant groups with a range of cognitive and/or behavioural needs (e.g. substance misuse, psychiatric, psychosocial, cognitive, mental health issues), and interventions used to treat these, including cognitive behavioural therapy (CBT), telepsychiatry, counselling and other techniques that promote behaviour change and were most likely to feature in the health care literature. It should be noted that physical health conditions were not excluded from the search results as reviews including these conditions tended to explore the conditions described above, with physical and mental health conditions often inextricably linked.

We identified seven systematic reviews for in-depth thematic analysis.

2. Summary of reviews

2.1 Overview

The reviews included in the thematic analysis sought to evaluate the efficacy of various methods of delivering care support to patients remotely through the use of technology. The exact nature of care and application of technology was dependant on the patient's healthcare needs.

The types of support described by the reviews can be categorised as; educational, self-management/self-help and/or treatment, therapy, and rehabilitation. Forms of technological support were delivered as an adjunct to standard care, as an alternative or as a partial replacement to conventional face-to-face care

The reviews were published between 2012 and 2016. The number of studies in each review ranged from six (Välimäki et al., 2012) to 101 (Mayo-Wilson and Montgomery, 2013) with the average number of studies being 36. The total number of participants in the smallest review was 531 (Khan et al., 2015) and in the largest was 22,047 (Flodgren et al., 2015). The average number of participants per review was 2,535. Participants in all reviews were aged

18 and over and experienced a range of physical and psychological health conditions, the latter including anxiety, depression and psychosocial factors affecting mental health and individuals' ability to cope with their primary condition.

Although not all of the reviews focussed primarily on psychological conditions, all discussed mental health, whether this was experienced directly or indirectly by the individual. Some review participants required prolonged or lifelong support for conditions in order to recover or manage health conditions induced by schizophrenia, diabetes, multiple sclerosis and stroke (Khan et al., 2015; Laver et al., 2013; Pal et al., 2013). Four of the studies focussed specifically on the delivery of psychological therapy aimed at changing patient behaviour (Eccleston et al., 2014; Mayo-Wilson and Montgomery, 2013; Olthuis et al., 2016; Välimäki et al., 2012). Three referred specifically to the delivery of CBT (Mayo-Wilson and Montgomery, 2013; Olthuis et al., 2016).

2.2 Outcomes measured

All reviews included interventions that aimed to achieve primary and secondary outcomes associated with improved wellbeing and quality of life. For example, in one review 38 of the 93 studies focussed primarily on quality of life/health (Flodgren et al., 2015). Outcomes were examined using a series of different measures aimed at assessing improvements in daily life. Examples included:

- The Functional Independence Measure (Laver et al., 2013)
- Health Quality of Life Questionnaires (Flodgren et al., 2015)
- The Manchester Short Assessment of Quality of Life (Välimäki et al., 2012).

Scales cut across a number of areas enabling reviews to build an understanding of improvements to health and functional/participatory activities such as employment, education and social integration. All of the reviews referred to outcomes scales related to measures of patient mental and/or psychological states. This included both severe mental health and global states such as schizophrenia as well as fluctuations in anxiety, depression and other indicators of psychosocial wellbeing. Examples included:

- The Social Anxiety Scale
- The Social Phobia Scale
- Centre for Epidemiological Studies Short Depression Scale
- The Clinical Global Impression Scale
- The Global Assessment of Functioning Scale
(Eccleston et al., 2014; Mayo-Wilson and Montgomery, 2013; Olthuis et al., 2016; Välimäki et al., 2012).

Other outcome measures included psychosocial functions such as mood and changes to cognitions, knowledge and understanding/self-efficacy (Pal et al., 2013). Interventions that sought to provide patients with education and information to enhance their ability to manage their health condition often looked at treatment compliance. An example of this is communication technology in patient education and support for people with schizophrenia (Välimäki et al., 2012). More specialised interventions (e.g. targeting a particular health condition) used relevant health related measures to form judgements of efficacy. Other outcome measures that were less prevalent included treatment acceptability and cost

implications.

2.3 Statistical analysis

All of the systematic reviews described in Table B1 (with the exception of Välimäki et al., 2012) used a random-effects statistical model as the basis for their analysis. A random-effects model is appropriate for use when meta-analysts are synthesising data from a range of studies performed by other researchers as it does not assume a true effect size which is consistent across all the included studies. A random-effects model therefore calculates wider confidence intervals around the effect sizes than a fixed-effects model which assumes homogeneity of effect – i.e. that all the included studies are functionally equivalent (Borenstein, 2009). The predominance of random-effects analyses in the systematic reviews described in Table B1 therefore suggests that they describe a heterogeneous range of primary studies, with considerable variance between interventions, populations and contexts.

The reviews predominantly used risk ratios as the basis for their analysis. However, in some instances outcome measures were inconsistent among the primary studies, and the reviewers therefore opted to use standardised mean outcome measure differences instead of risk ratios.

Given the wide range of outcomes reported in the systematic reviews, we have chosen to analyse and describe only those which we understand to be relevant to the intended effects of remote technologies used in probation supervision (e.g. supporting changes in client cognitions, behaviours and affective states). In doing so, we noted the review authors' evaluations of quality (GRADE; Guyatt et al., 2008) and risk of bias pertaining to each outcome.

Table B1: Systematic reviews included in the thematic analysis

Review	Intervention	Technology	Relevant outcomes	Studies (participants)	Effect
Välimäki, Maritta, Heili Hätönen, Mari Lahti, Lauri Kuosmanen, and Clive E. Adams. "Information and Communication Technology in Patient Education and Support for People with Schizophrenia." <i>Cochrane Database of Systematic Reviews</i> , no. 10 (2012). https://doi.org/10.1002/14651858.CD007198.pub2 .	Psychoeducation to maintain functioning and educate people with schizophrenia or related psychosis.	Information communication technology including the use of computers, telephones, television, radio, video and audio recordings.	<p>Global State (insanity)</p> <ul style="list-style-type: none"> Not improved in the short term <p>Mental State</p> <ul style="list-style-type: none"> Not improved in the short term <p>Compliance</p> <ul style="list-style-type: none"> Participants leaving the study early 	<p>1(84)</p> <p>1(84)</p> <p>2(116)</p>	<p>Risk ratios for global state and compliance were non-significant, it is therefore not possible to infer an effect of the intervention.</p> <p>The intervention was associated with a short-term improvement in mental state.</p>
Pal, Kingshuk, Sophie V. Eastwood, Susan Michie, Andrew J. Farmer, Maria L. Barnard, Richard Peacock, Bindie Wood, Joni D. Inniss, and Elizabeth Murray. "Computer-based Diabetes Self-management Interventions for Adults with Type 2 Diabetes Mellitus." <i>Cochrane Database of Systematic Reviews</i> , no. 3 (2013). https://doi.org/10.1002/14651858.CD008776.pub2 .	Intervention includes features that enable; goal setting, confidence building, psychosocial adjustment to life, management of anxiety, depression and stress.	Computer software application to enable self-management through feedback, advice, reinforcement and rewards, patient decision support, goal setting and reminders.	<p>Depression</p> <ul style="list-style-type: none"> Follow-up 2-18 months <p>Health Related Quality of Life</p> <ul style="list-style-type: none"> Follow-up 2-18 months 	<p>6(2273)</p> <p>5(2113)</p>	No statistically significant differences between the intervention and control groups.
Olthuis, Janine V., Margo C. Watt, Kristen Bailey, Jill A. Hayden, and Sherry H. Stewart. "Therapist-supported Internet Cognitive Behavioural Therapy for Anxiety Disorders in Adults." <i>Cochrane Database of Systematic Reviews</i> , no. 3 (2016). https://doi.org/10.1002/14651858.CD011565.pub2 .	Internet CBT (ICBT) to support patients with anxiety disorder. Intervention also sought to improve patient quality of life.	Internet, video, e-mail or telephone support.	<p>Anxiety – Post Treatment</p> <ul style="list-style-type: none"> Clinically important improvement in anxiety Anxiety symptom severity General anxiety symptom severity <p>Quality of Life – Post Treatment</p> <ul style="list-style-type: none"> Self-report measures of quality of life or functional disability 	<p>4(365)</p> <p>7(450)</p> <p>6(343)</p> <p>5(392)</p>	<p>No statistically significant differences between exposure to face-to-face (standard) CBT and therapist supported internet-CBT.</p> <p>Quality of life demonstrated a small effect size in favour of the treatment.</p>
Mayo-Wilson, Evan, and Paul Montgomery. "Media-delivered Cognitive Behavioural Therapy and Behavioural Therapy (Self-help) for Anxiety Disorders in Adults." <i>Cochrane Database of Systematic Reviews</i> , no. 9 (2013). https://doi.org/10.1002/14651858.CD005330.pub4 .	Intervention uses different forms of media to deliver CBT or Behavioural Therapy to adults with anxiety disorders.	Audio recordings, video recordings, computers and internet.	<ul style="list-style-type: none"> Anxiety – self-rated at post-treatment Depression – self-rated at post-treatment 	<p>24(1360)</p> <p>13(906)</p>	<p>Analysis found a small effect size for anxiety (favouring face-to-face treatment).</p> <p>Depression and quality of life outcomes did not exhibit statistically</p>

Laver, Kate E., Daniel Schoene, Maria Crotty, Stacey George, Natasha A. Lannin, and Catherine Sherrington. "Telerehabilitation Services for Stroke." <i>Cochrane Database of Systematic Reviews</i> , no. 12 (2013). https://doi.org/10.1002/14651858.CD010255.pub2 .	Telerehabilitation to improve performance of activities of daily living. Use of telerehabilitation to offer greater independence in self-care and domestic life.	Still photography, telephone calls, videoconferencing technology and virtual reality.	<ul style="list-style-type: none"> Quality of Life – self-rated at post-treatment Independence in Activities of Daily living e.g. self care, health-related quality of life and cognitive function 	2(661)	significant differences between media-delivered and face-to-face interventions.
Khan, Fary, Bhasker Amaty, Jurg Kesseling, and Mary Galea. "Telerehabilitation for Persons with Multiple Sclerosis." <i>Cochrane Database of Systematic Reviews</i> , no. 4 (2015). https://doi.org/10.1002/14651858.CD010508.pub2 .	Telerehabilitation to achieve patient centred goals – enhance functional activity, self-management and participation.	Telecommunication, internet, video conferencing, telephone and virtual reality.	<ul style="list-style-type: none"> Change in Psychological Outcomes e.g. cognitive function, depressive & anxiety symptoms Change in Quality of Life e.g. psychosocial function, employment, education and social integration 	3(139) 6(392)	Quantitative synthesis of effect size not possible. Authors concluded that there was some limited evidence of a small effect of the technology with regard to the two outcomes.
Ecceleston, Christopher, Emma Fisher, Lorraine Craig, Geoffrey B. Duggan, Benjamin A. Rosser, and Edmund Keogh. "Psychological Therapies (Internet-delivered) for the Management of Chronic Pain in Adults." <i>Cochrane Database of Systematic Reviews</i> , no. 2 (2014). https://doi.org/10.1002/14651858.CD010152.pub2 .	CBT focussing on skill building, problem solving, relaxation training and management/self-help to support patients with chronic pain.	Internet-delivered and web-based interactive psychological therapy.	<ul style="list-style-type: none"> Depression Headache post-treatment Non-headache post-treatment Anxiety Headache post-treatment Non-headache post-treatment Quality of Life Non-headache post-treatment 	4(617) 9(1013) 3(546) 10(1144) 3(202)	No evidence of a statistically significant reduction in depression or anxiety associated with internet-delivered therapies (headache related pain measured post-treatment). Effect sizes associated with treatment identified as very small for depression and anxiety – not found to be statistically significant for quality of life (non-headache pain measured post-treatment).

2.4 Systematic review findings

All of the reviews discussed interventions and their ability to deliver health outcomes of a psychological, psychosocial and physical nature. The outcomes measured did not quantify the nature of the helping relationship (e.g. duration and frequency of contact) and it was not possible to determine from any of the reviews the extent of the contact or communication between patient and professional.

Concerning psychological health there was some evidence of the effective use of technology. For example, the review by Välimäki et al. (2012) included six studies measuring outcomes for 1,063 participants, all of whom experienced schizophrenia. There was no evidence to suggest that the use of information and communication technology (ICT) was effective to deliver psychoeducational interventions compared with standard care for people with severe mental illness. Psychoeducation was, however, found to improve mental state in the short term.

The review by Olthuis et al. (2016) explained that telephone or email therapist supported Internet Cognitive Behavioural Therapy was effective in treating adults with anxiety when compared to traditional face-to-face methods. Similar findings were observed in a review of 15 studies by Eccleston et al. (2014). This synthesis found that psychological therapies for chronic pain management delivered via the internet with little or no support from a healthcare professional were effective in providing support for the same conditions.

The largest review included in our analysis (Mayo-Wilson and Montgomery, 2013; consisting of 101 studies, N=8,403) indicated that media-delivered CBT and behavioural therapy with the absence of a therapist had positive effects on anxiety and depression and that there were no significant differences when compared to face-to-face treatment.

The second largest systematic review included in our analysis (Flodgren et al. 2015) sought to measure the effects of telemedicine on healthcare outcomes. The review found that telemedicine, a method whereby a professional is required to respond in either delayed or real time using videoconferencing, was associated with improved quality of life when compared with service as standard. Seven out of 93 studies included in this review focussed on those who experienced mental health and substance abuse problems, and synthesising findings the reviewers found no differences in the effect of therapy delivered over videoconferencing compared with face-to-face delivery.

2.4.1 Psychoeducation – schizophrenia

The systematic review by Välimäki et al. (2012) aimed to assess the effectiveness of ICT in providing patient education and support for individuals with schizophrenia in comparison with standard care. Global state (a global assessment of psychological functioning) was a primary outcome, with mental state and compliance (measured by whether a participant left the study early) featuring as secondary outcomes of interest. Risk ratios for global state and compliance were close to 1, suggesting little difference between the experimental and control groups in terms of the effect of ICT. The intervention improved mental state in the short term, but it should be noted that analysis of outcomes for both mental state and global state included just one study containing a modest sample size (n=84), hence it is not possible to make confident inferences about the generalisability of this finding.

2.4.2 Therapist-supported Internet Cognitive Behavioural Therapy (ICBT) for anxiety disorder in adults

Olthuis et al. (2016) reviewed the effectiveness of therapist-supported ICBT amongst adults with anxiety disorders. The review principally sought to investigate whether exposure to ICBT reduced patients' symptoms of anxiety compared with various control conditions (e.g. waitlist or face-to-face CBT). No significant differences were found in outcomes associated with symptoms of anxiety between exposure to face-to-face (standard) CBT and therapist supported ICBT. The outcome for 'quality of life' (measured post-treatment) demonstrated a small effect size in favour of the intervention treatment group (compared with face-to-face CBT).

2.4.3 Internet psychological therapy – pain management

Eccleston et al. (2014) examined internet-delivered psychological therapy compared with combined control groups (active control, treatment-as-usual, waiting list). Outcomes of interest included those measured at post-treatment such as depression, anxiety and quality of life amongst participants who experienced headache or non-headache pain. For headache related pain measured post-treatment, there was no evidence of a statistically significant reduction in depression or anxiety associated with internet-delivered therapies. Effect sizes associated with exposure to the intervention for non-headache pain were found to be very small for depression and anxiety, and were not found to be statistically significant for quality of life. Eccleston et al. note that 'considerable uncertainty remains around the estimates of effect' for a range of reasons associated with the number of primary studies included and their methodologies.

2.4.4 Media delivered CBT

Mayo-Wilson and Montgomery (2013) evaluated the effects of media-delivered behavioural and cognitive-behavioural therapies for anxiety disorders in adults, compared to face-to-face interventions. They measured outcomes including anxiety, depression, and quality of life (participant self-ratings, post-treatment). Their analysis found a small effect size for anxiety, favouring face-to-face treatment over the technology assisted self-help intervention. Analyses of depression and quality of life outcomes did not find statistically significant differences between media-delivered and face-to-face interventions.

2.4.5 Computer-based self-management (diabetes)

Pal et al. (2013) investigated the effect of computer-based self-management interventions for adults with type 2 diabetes compared with a range of control conditions. Relevant outcomes included health-related quality of life and depression. The review authors did not observe statistically significant differences in these outcomes between the intervention and control groups, and concluded that there was no evidence of the relative benefits of the technologies across a range of cognitive, behavioural or emotional outcomes.

2.4.6 Telerehabilitation for persons with multiple sclerosis

A review by Khan et al. (2015) explored the potential for telerehabilitation to support individuals with multiple sclerosis, compared with standard care received in rehabilitation

centres. Their review included six (N=392) randomised control trials which measured changes in quality of life, and three (N=139) measuring changes in psychological outcomes (e.g. cognitive functions) through the application of counselling and education. Due to a high degree of heterogeneity between the studies, the review authors were unable to conduct a quantitative synthesis of these outcomes. However, they concluded that there was some limited evidence for the efficacy of telerehabilitation with regard to quality of life and psychological outcomes.

2.4.7 Telerehabilitation services for stroke

Laver et al. (2013) reviewed the effectiveness of telerehabilitation among stroke survivors. Trials included in their review contained comparisons between groups exposed to telerehabilitation and those who received either in-person rehabilitation or no rehabilitation. They measured a number of outcomes, including independence in activities of daily living (measured post intervention). With regard to this outcome, quantitative synthesis across two studies (N=661) found no statistically significant difference between the intervention and control group.

3. Thematic analysis

The systematic reviews identified by our search highlight a range of applications of technology in healthcare, along with limited evidence which suggests that technological support can be as effective as traditional forms of patient support in this arena. The interventions described in the reviews share the objective of improving health related outcomes for patients, but differ in how this may be achieved, e.g. in terms of the intensity of support, the nature of patients' conditions, and the aims of treatment.

3.1 Self-management and behaviour change

Studies by Eccleston et al. (2014), Pal et al. (2013) and Välimäki et al. (2012) describe the purpose of technology as a vehicle for influencing health behaviour, changing attitudes and beliefs, and managing expectations. It is assumed that by increasing an individual's awareness and knowledge of their condition, they are more likely to develop adaptive behaviours. This may include the acquisition of skills that enable patients to deal with negative symptoms (such as cognitive impairment faced by schizophrenic patients) or ways to respond to experiences of fear, anger and guilt. Technologies which transfer knowledge to initiate behaviour change may increase adherence to medical advice and treatment as well as motivating patients to improve their health through self-empowerment. They also have the potential to provide information that may otherwise have required face-to-face interactions with a healthcare professional, therefore providing the opportunity to reduce costs. This approach is especially important for those experiencing long-term health conditions as it aims to move away from acute in-house care by offering a more sustainable alternative.

The quantitative evidence showed that generally there were no statistically significant differences in outcomes between control and treatment groups. The review which focussed on patients with schizophrenia was subject to high dropout rates making it challenging to derive any meaningful effect sizes (Välimäki et al., 2012). Despite findings that self-management support may help to reduce pain, Eccleston et al. (2014) in their follow-up

analysis found no evidence to suggest improvements for symptoms of depression and anxiety, with effect sizes described as small and to be treated with caution. These findings were echoed by Pal et al. (2013).

3.2 *Delivery of recognised and established treatments*

Technology may also be used in healthcare to facilitate the delivery of existing treatments. This was apparent in three of the systematic reviews we analysed, each describing the delivery of cognitive-behavioural or psychological therapies via different technological applications (Mayo-Wilson and Montgomery, 2013; Olthuis et al., 2016; Välimäki et al., 2012). CBT is considered effective by many due to its extensive evidence base, but may be costly to deliver at scale (with associated logistical considerations) as the predominant delivery model uses face-to-face interactions. Technology may therefore have the potential to overcome some of these challenges by providing a medium whereby patients are able to access therapies from rural/remote locations (including their own home) with little or no interaction with healthcare professionals. Furthermore, accessing care in this way means that healthcare providers are able to manage their resources more efficiently, reducing waiting times and increasing the numbers of patients treated.

Therapist-supported ICBT was found to be an effective treatment for anxiety in adults when compared to a waiting list control group (Olthuis et al., 2016), but was not found to have significantly different outcomes to face-to-face CBT. Similarly, findings from Mayo-Wilson and Montgomery (2013) described no significant difference between face-to-face therapy and media-delivered CBT. However they noted a high risk of bias across the included studies, reducing their confidence in the observed effect sizes. Furthermore, the systematic review by Välimäki et al. (2012) showed no clear benefit of using ICT when compared with standard or usual care and/or other methods of education and support for people with severe mental illness.

3.3 *Implications for long-term care*

The need for long-term healthcare support has proved a substantial challenge for healthcare providers due to an aging population and an increasing number of individuals living with health conditions for longer. Closely related to this are two reviews which focus primarily on telerehabilitation for patients in need of long-term support upon discharge from hospital. The systematic reviews by Khan et al. (2015) and Laver et al. (2013) explore the potential for telerehabilitation to provide continued care to support patient recovery and reintegration. Advantages of telerehabilitation include the facilitation of home assessments and diagnosis, goal setting and monitoring, thus allowing healthcare professionals to increase or decrease intensity of care dependent upon the needs of the individual. This is particularly relevant in the instance of stroke and multiple sclerosis where an individual may be subject to remissions or sudden deteriorations in health. Using telerehabilitation means therapists are better poised to respond to these changes and can therefore optimise timing, duration and intensity of support, abilities which may not have been possible using face-to-face alternatives.

However, there is a lack of clear empirical evidence to substantiate these suggestions. The review by Laver et al. (2013) concluded that there was insufficient data to draw conclusions

regarding the effects of the intervention on health-related quality of life or participant satisfaction, and quantitative synthesis was not possible in the review by Khan et al. (2015) due to the heterogeneity between the included studies.

4. Conclusion

4.1 Overview

We searched The Cochrane Database for Systematic Reviews of the use of technology in the delivery of healthcare, to patients suffering from a range of factors affecting their psychological and psychosocial wellbeing. We were interested particularly in the following:

- patients in receipt of long-term care;
- care that might traditionally be delivered in a one-to-one relationship between a health professional and a patient;
- interventions that were predominantly focused on cognitive-behavioural change; and
- outcomes similar to those pursued in offender supervision.

Four of the systematic reviews we examined involved either completely or partially replacing the standard person-to-person model of healthcare delivery with a technological solution. Reviews of this type of technological solution included therapies delivered using audio/video recordings in the absence of a healthcare professional (Mayo-Wilson and Montgomery, 2013) and self-management/self-care support as a stand-alone intervention to enhance patient's ability to cope with their condition through education provided over the internet or using ICT (Eccleston et al., 2014; Pal et al., 2013; Välimäki et al., 2012). In the other reviews technology was used to facilitate or enhance standard person-to-person healthcare delivery (Khan et al., 2015; Mayo-Wilson and Montgomery, 2013; Olthuis et al., 2016). Studies that met this criterion generally adapted standard face-to-face care provided by a professional using remote technology to support, respond, review and facilitate communication at different points in time.

Looking across the reviews the evidence available was assessed to be of low quality using the GRADE approach to systematic reviews. Therefore the findings from the reviews must be treated with caution. Overall the reviews suggest that the types of healthcare interventions we focused on, when delivered using technology, do not achieve better results when compared to 'standard care'. None of the reviews we examined contained economic analysis, but it is possible that technology delivered cost savings without delivering worse outcomes. In that scenario there might still be a case for adopting technology to help deliver services.

4.2 Applying the findings to criminal justice

We cannot simply transplant the findings from this short review into a criminal justice context. Nevertheless, while it would be unwise to push the analogy between the health sector and the criminal justice sector too far, both face some of the same pressures. The criminal justice sector has faced cuts in funding over recent years and, while healthcare funding in the UK is rising, it struggles to match increased demand resulting from factors such as new and more expensive health interventions, an ageing population, and greater public expectations about the quality of healthcare. Both sectors are dealing with an ageing

population. The fastest growing population in the prison sector is prisoners over 50, more of whom will now be subject to licence conditions on release. There has been a move in healthcare to deliver more services in the community and less in hospitals: the probation sector also delivers services both in prisons and in the community. However, there are also important differences. For example, in the criminal justice sector, clients are mandated to participate.

In this final section we consider the implications of this review for the use of technology in the criminal justice sector. First, it is worth noting the wide range of technologies being used in the health sector and the wide range of uses to which it is put. Technology varied from simple telecommunications to virtual reality using gaming technology such as the Xbox (Gutierrez, 2013). Many of the technologies depended on internet access. Technological interventions were described in some cases as being able to operate at a low-bandwidth meaning they were conducive to use in remote areas where signal strength may be restricted. In the probation sector, internet access is often restricted for security reasons and the technology available to staff is also sometimes limited meaning that the transfer of technology into the sector will not always be straightforward. Nevertheless, the reviews we examined suggest that there are often relatively simple technological solutions that can be considered.

Secondly, there were clear differences in the way that technology was deployed. We saw a broad distinction between (i) technology replacing a human and (ii) technology enhancing a human-delivered intervention. Unfortunately there was insufficient evidence in the reviews examined to judge whether either approach was more or less effective at delivering outcomes. Given that the evidence suggested that technology had no positive or negative effect on outcomes, there might be merit in testing both approaches in the criminal justice system. However, given the emphasis on assessing and managing dynamic risk in the criminal justice sector, perhaps the use of technology to support rather than replace face-to-face interactions is a more realistic option.

Remote healthcare or eHealth provides a useful model to consider. Telehealth is the most basic element of eHealth and is simply the remote exchange of data between individuals and professionals often in the form of video or email consultations (Honeyman et al., 2016). Telehealth is typically used with patients who require long-term care over a distance. Variations include telemonitoring, telecoaching, telecare and telemedicine, but all share the common component of tele-communication.

The use of eHealth for remote healthcare is regarded as one of the four big trends in technology as witnessed by the NHS and its patients (Castle-Clarke, 2018). This is because more and more people are opting to receive care where they live. Telepsychiatry is regarded as the most active application of telemedicine in the Western world. Telepsychiatry uses tele-communication to deliver specialised mental health including education, therapy and medication management support to patients in remote areas where services are less likely to be positioned (Malhotra et al., 2013). This form of communication facilitates interactive and live mental health care between psychiatrist and patient while enabling the sharing of medical information. For probation services that operate in rural areas, or where there is a need to deliver more frequent contact than the usual schedule of face-to-face meetings allows, the telehealth approach may offer important lessons.

Thirdly, and linked to the previous point, it was common in the reviews we examined to see technology being used to deliver established interventions, often those that were cognitive-

behavioural in approach (Mayo-Wilson and Montgomery, 2013; Olthuis et al., 2016; Välimäki et al., 2012). Given that the probation sector has invested heavily in the development and promotion of accredited programmes, many of which are cognitive behavioural, this seems to offer one possible starting point for exploring the use of technology in the delivery of probation services.

Fourthly, the response of users is clearly key in the adoption of technology. The reviews we examined did not provide any clear evidence on how receptive staff and patients were to different technological solutions. In any implementation of technology in the probation sector, evaluations should examine user views.

Finally, and as highlighted in the main review to which this report is appended, there is a clear need to develop a robust evidence base on the use of technology in probation. It is noticeable that the evidence base provided by the reviews that we examined is not conclusive and often this at least partly due to study design. There will be a need to rigorously evaluate the application of technology in probation settings. This will often require counterfactual evaluation designs, coupled to high-quality implementation evaluations and economic evaluation. Given the importance of testing technologies in different settings with different criminal justice interventions, there would be merit in designing programmes involving testing of different configurations of technology and practice.

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